Operating Instructions

(Translation of original)

BRINKMANN Immersion Pumps

STA/SAL901…1303

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Brinkmann Immersions pumps of the series STA/SAL901 ... 1303

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1 Indication to the manual

This operating manual gives basic instructions which are to be observed during installation, operation and maintenance of the pump. It is therefore imperative that this manual be read by the responsible personnel and operator prior to assembly and commissioning. It is always to be kept available at the installation site.

1.1 Identification of safety instructions in the operating manual

Safety instructions given in this manual non-compliance with which would affect **safety** are identified by the following symbol

Safety sign according with ISO 3864 – B.3.1

or where **electrical safety** is involved, with:

Safety sign according with ISO 3864 – B.3.6

Where non-compliance with the safety instructions may cause a risk to the machine and it's function the word

ATTENTION

is inserted.

2 Description of product

2.1 General description of the pump

Pumps of this type are one or multi-stage rotary pumps where the impellers are fixed on the driving shaft extension. The pump shaft and motor shaft are interconnected by means of a shaft clamp. Pump and motor form a compact and space-saving unit. These pumps are fitted out with semi-open impellers, (and a suction screw SAL construction).
Vertically mounted pumps are equipped with a mounting flange. The pump end immerses into the tank and the motor extends vertically above the tank.

2.2 Intended use

The immersion pumps of the series STA/SAL are suitable for handling contaminated coolants within the limiting application in accordance with table 1. The pumps of SAL are suitable for handling extremely inflated fluids.

Limit of Application (Table 1)

Type	STA901...1303	SAL901...1303
Mediums	Cooling emulsions, cooling- and cutting-oils	
Kinetic viscosity of the medium	...45 mm^2/s	...45 mm^2/s
Temperature of medium	0 ... 80 °C	0 ... 80 °C
Particle-size in the medium	9 mm STA/SAL 901… 904 12 mm STA/SAL1001…1004 14 mm STA/SAL1301…1303	
min. delivery volume	1% of Q max.	
Dry running	Dry running causes increased wear and should be avoided. During the test of the direction of rotation (< 30 s) permissible.	
Switching-on frequency per hour	Motors less 3 kW max. 200 from 3 kW to 4.0 kW max. 40 from 5.0 kW to 10.3 kW max. 20 Motors 11 kW and higher max. 15	
Ambient temperature	40 °C	
Set-up altitude	1000 m	

ATTENTION

The pumps are to be operated within their design limits. Applications outside of these limits are not approved. The manufacturer is not responsible for any damages resulting from use of the pumps in such applications.

2.3 Technical data

Type	Type	Max. del. pressure bar / spec. weight 1	Max. del. volume l/min	Height [1] **H** mm	Depth of immersion STA[1, 2] **h** mm	Weight STA[3] **g** kg	Power 50 60 Hz kW	Noise level[4] STA dBA / 50 Hz
STA901 / 200	SAL901 / 220	2.2	930	429	200	49	2.6 2.6	66
/ 300	/ 320				300	51		
/ 430	/ 450				430	53		
/ 550	/ 570				550	56		
/ 750	/ 770				750	61		
/ 980	/1000				980	68		
/1100	/1120				1100	72		
STA902 / 270	SAL902 / 290	4.3	980	504	270	82	5.5 5.5	71
/ 370	/ 390				370	85		
/ 500	/ 520				500	89		
/ 620	/ 640				620	93		
/ 820	/ 840				820	98		
/1050	/1070				1050	105		
/1170	/1190				1170	113		
STA903 / 340	SAL903 / 360	6.4	1050	612	340	118	9.0 10.3	74
/ 440	/ 460				440	121		
/ 570	/ 590				570	125		
/ 690	/ 710				690	129		
/ 890	/ 910				890	134		
/1120	/1140				1120	141		
STA904 / 410	SAL904 / 430	8.6	1100	620	410	144	11.0 12.6	74
/ 510	/ 530				510	147		
/ 640	/ 660				640	151		
/ 760	/ 780				760	155		
/ 960	/ 980				960	160		
/1190	/1210				1190	165		
STA1001 / 210	SAL1001 / 230	2.2	1200	429	210	50	2.6 2.6	63
/ 310	/ 330				310	52		
/ 440	/ 460				440	54		
/ 560	/ 580				560	57		
/ 760	/ 780				760	62		
/ 990	/1010				990	69		
/1110	/1130				1110	73		
STA1002 / 290	SAL1002 / 310	4.3	1300	504	290	83	5.5 5.5	71
/ 390	/ 410				390	86		
/ 520	/ 540				520	90		
/ 640	/ 660				640	94		
/ 840	/ 860				840	99		
/1070	/1090				1070	106		
/1190	/1210				1190	111		
STA1003 / 370	SAL1003 / 390	6.0	1350	612	370	119	9.0 10.3	74
/ 470	/ 490				470	122		
/ 600	/ 620				600	126		
/ 720	/ 740				720	130		
/ 920	/ 940				920	135		
/1150	/1170				1150	142		
STA1004 / 450	SAL1004 / 470	8.4	1400	620	450	150	13.0 15.0	74
/ 550	/ 570				550	153		
/ 680	/ 700				680	157		
/ 800	/ 820				800	161		
/1000	/1020				1000	166		
/1230	/1250				1230	173		
STA1301 / 210	SAL1301 / 230	2.2	1400	468	210	57	4.0 4.0	71
/ 310	/ 330				310	59		
/ 440	/ 460				440	61		
/ 560	/ 580				560	64		
/ 760	/ 780				760	69		
/ 990	/1010				990	76		
/1110	/1130				1110	79		

Type	Type	Max. del. pressure bar / spec. weight 1	Max. del. volume l/min	Height [1] **H** mm	Depth of immersion STA[1, 2] **h** mm	Weight STA[3] **g** kg	Power 50 60 Hz kW	Noise level[4] STA dBA / 50 Hz
STA1302 / 290	SAL1302 / 310	4.3	1600	612	290	108	7.5 8.6	74
/ 390	/ 410				390	111		
/ 520	/ 540				520	115		
/ 640	/ 660				640	119		
/ 840	/ 860				840	124		
/1070	/1090				1070	131		
STA1303 / 370	SAL1303 / 390	6.5	1620	620	370	138	11.0 12.6	74
/ 470	/ 490				470	141		
/ 600	/ 620				600	147		
/ 720	/ 740				720	149		
/ 920	/ 940				920	154		
/1150	/1170				1150	161		

1) Dimensions in accordance with page 5

2) **Depth of immersion SAL = h + 20 mm ;** 3) **Weight SAL = g + 1 kg**

4) Noise emissions measured in accordance with DIN 45635 at a distance of 1 m

The motor is surface-cooled and compliant with
DIN IEC 34 and EN 60034 (protection degree IP 55).

3 Safety instructions

When operating the pump, the safety instructions contained in this manual, the relevant national accident prevention regulations and any other service and safety instructions issued by the plant operator are to be observed.

3.1 Hazards in the event of non-compliance with the safety instructions

Non-compliance with the safety instructions may produce a risk to the personnel as well as to the environment and the machine and results in a loss of any right to claim damages.
For example, non-compliance may involve the following hazards:

- Failure of important functions of the machines/plant
- Failure of specified procedures of maintenance and repair
- Exposure of people to electrical, mechanical and chemical hazards
- Endangering the environment due to hazardous substances being released

3.2 Unauthorized modes of operation

- Pump may not be used in potentially explosive environments**!**
- Pump and discharge piping are not designed to hold any weight and may not be used as a step ladder.

3.3 Remaining Risk

Risk of Injury!
Risk of squeezing or crushing body parts when installing or removing the pump exists. Proper and secured lifting tools must be used.

Risk of burns!
The pump must have cooled down sufficiently prior to commencing any repair, maintenance or installation.

3.4 Qualification and training of operating personnel

The personnel responsible for operation, maintenance, inspection and assembly must be adequately qualified. Scope of responsibility and supervision of the personnel must be exactly defined by the plant operator. If the staff does not have the necessary knowledge, they must be trained and instructed, which may be performed by the machine manufacturer or supplier on behalf of the plant operator. Moreover, the plant operator is to make sure that the contents of the operating manual are fully understood by the personnel.

3.5 Safety instructions relevant for operation

- If hot or cold machine components involve hazards, they must be guarded against accidental contact.
- Guards for moving parts (e.g. coupling) must not be removed from the machine while in operation.
- Any leakage of hazardous (e.g. explosive, toxic, hot) fluids (e.g. from the shaft seal) must be drained away so as to prevent any risk to persons or the environment. Statutory regulations are to be complied with.

- Hazards resulting from electricity are to be prevented (see for example, the VDE Specifications and the bye-laws of the local power supply utilities).
- The pumps' stability against falling over is not ensured unless it is properly mounted onto the tank.
- The female threads on the motor MUST NOT be used to lift the entire pump and motor assembly.

3.6 Safety instructions relevant for maintenance, inspection and assembly work

Any work on the machine shall only be performed when it is at a standstill, it being imperative that the procedure for shutting down the machine described in this manual be followed.
Pumps and pump units which convey hazardous media must be decontaminated.
On completion of work all safety and protective facilities must be re-installed and made operative again.
Prior to restarting the machine, the instructions listed under "Start up" are to be observed.

3.7 Signs on the pump

It is imperative that signs affixed to the machine, e.g.:

- arrow indicating the direction of rotation
- symbols indicating fluid connections

be observed and kept legible.

3.8 Unauthorized alterations and production of spare parts

Any modification may be made to the machine only after consultation with the manufacturer. Using spare parts and accessories authorized by the manufacturer is in the interest of safety. Use of other parts may exempt the manufacturer from any liability.

4 Transport and storage

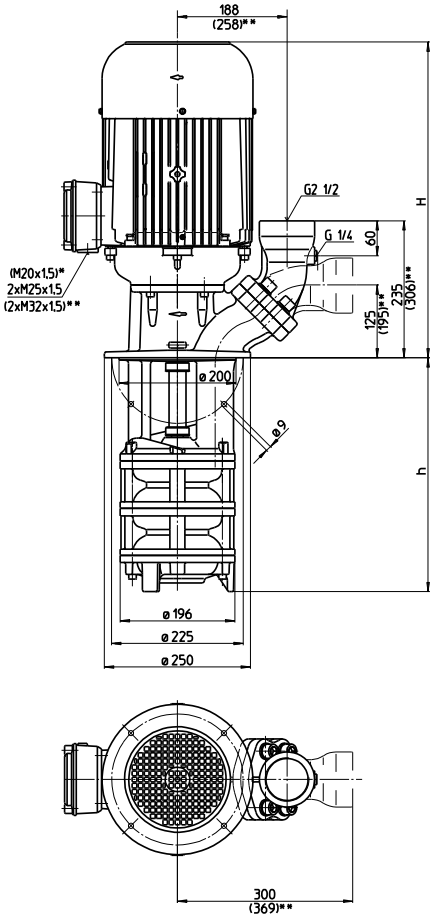
Protect the pump against damage when transporting.
The pumps may only be transported in a horizontal position and hooks or straps must be attached on the motor and pump end.
Do not use the pump shaft for connecting any transportation aids such as hooks or straps.
Pumps must be drained prior to their storage.
Store pump in dry and protected areas and protect it against penetration of foreign bodies.
Always store pump above the freezing point!

5 Installation and Connection

5.1 Mechanical installation

During any assembly or disassembly process the pumps must be secured against tipping trough ropes for example at all times.
Pumps must be mounted securely. Piping, tank and pumps must be mounted without any tension.
The inlet is at the bottom of the immersed pump body. The distance between the inlet and the tank bottom must be so large that the inlet can not be blocked by deposits during longer shutdowns.

To obtain the full flow rate it is recommended to choose for the pipework the nominal bore diameter of the pumps cross section for connection. Therefore pipe bends should be used, not pipe angles!
The pipework must be qualified for occuring hydraulic pressure.



*) Dimensions for STA901, 1001, 1301
**) Dimensions for STA904, 1004, 1303

ATTENTION

Maximum tightening torque for piping connections is 200 Nm!

When installed the space around the pump must be large enough to provide sufficient cooling of the motor.

Do not prop up the pressure line via the joining socket.

The pump must be mounted in that way that rotating parts under the cover of the coolant tank cannot be touched!

5.2 Electric wiring

All service work must be carried out by qualified service personnel. Pump must be disconnected from the power source and all rotating parts must stand still. Reassure that pump is disconnected from power source and cannot be switched on. Verify that there is no voltage at the terminal board!

According to the European Standard EN809 a motor overload must be installed and properly set to the full load amps stated on the pump name plate.

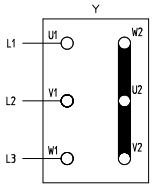
It is the responsibility of the machine operator to decide whether or not an additional emergency switch must be installed.

5.2.1 Circuit

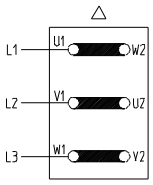
Tension voltage and frequency must correspond with the shown specification on the nameplate.
The pump must be wired so that a solid longterm electrical connection is ensured. Establish a solid ground connection.

The electrical wiring must be performed according to the wiring diagram shown inside the terminal box cover. (Please see above sample wiring diagrams)

Wiring diagram e.g.



Star connection
up to 5.5 kW
3 x 400 V, 50 Hz
resp. 380-420 V, 50 Hz



Delta connection
up to 5.5 kW
3 x 230 V, 50 Hz
resp. 220-240 V, 50 Hz

7.5 kW and over
3 x 400 V, 50 Hz
resp. 380-420 V, 50 Hz

There may be no foreign objects such as dirt, particles or humidity inside the terminal board.

Mount terminal board cover to motor tight against dust and humidity and close up all unused wiring ports.

ATTENTION

When Variable Frequency Drives are used interfering signals might occur.
Non-sinus shaped supply voltage from a variable frequency drive might result in elevated motor temperatures.

6 Start up / Shut down

6.1 Start up

ATTENTION

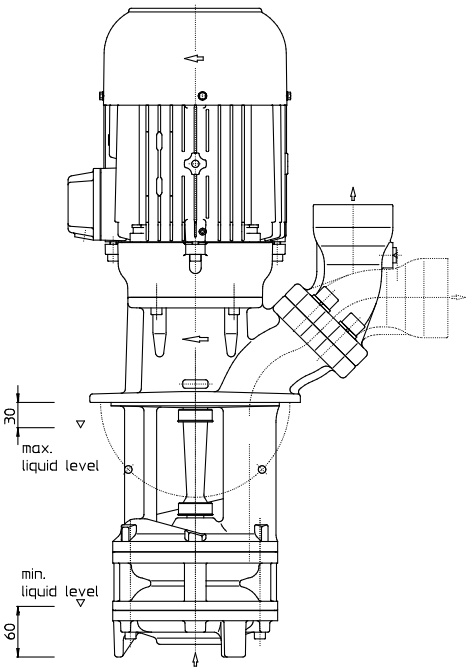
Switch off at the mains.
After connection the electrical wires, close the terminal box. Briefly start the motor (max. 30 sec.) and check the rotation according to the arrow on the top of the motor.
If the direction is incorrect change over two of the power leads.

6.2 Shut down

All service work must be carried out by qualified service personnel. Pump must be disconnected from the power source and all rotating parts must stand still. Reassure that pump is disconnected from power source and cannot be switched on. Verify that there is no voltage at the terminal board!
Open terminal box and disconnect the power leads.
Empty out the pump.

7 Operation

Liquid level
According to the drawing shown below, the maximum liquid level must stay about 30 mm below the mounting flange, also ensure that the minimal liquid level for the STA pump is 60 mm before starting up the motor, for the SAL pump the suction hole of the pump body must be covered with liquid.



If the pump should lock up and cease, shut pump down (see 6.2) and disconnect from power supply. Pump must be uninstalled and removed from the system prior to its repair.

8 Servicing and Maintenance

ATTENTION

The surface of the motor must be kept free of dirt.

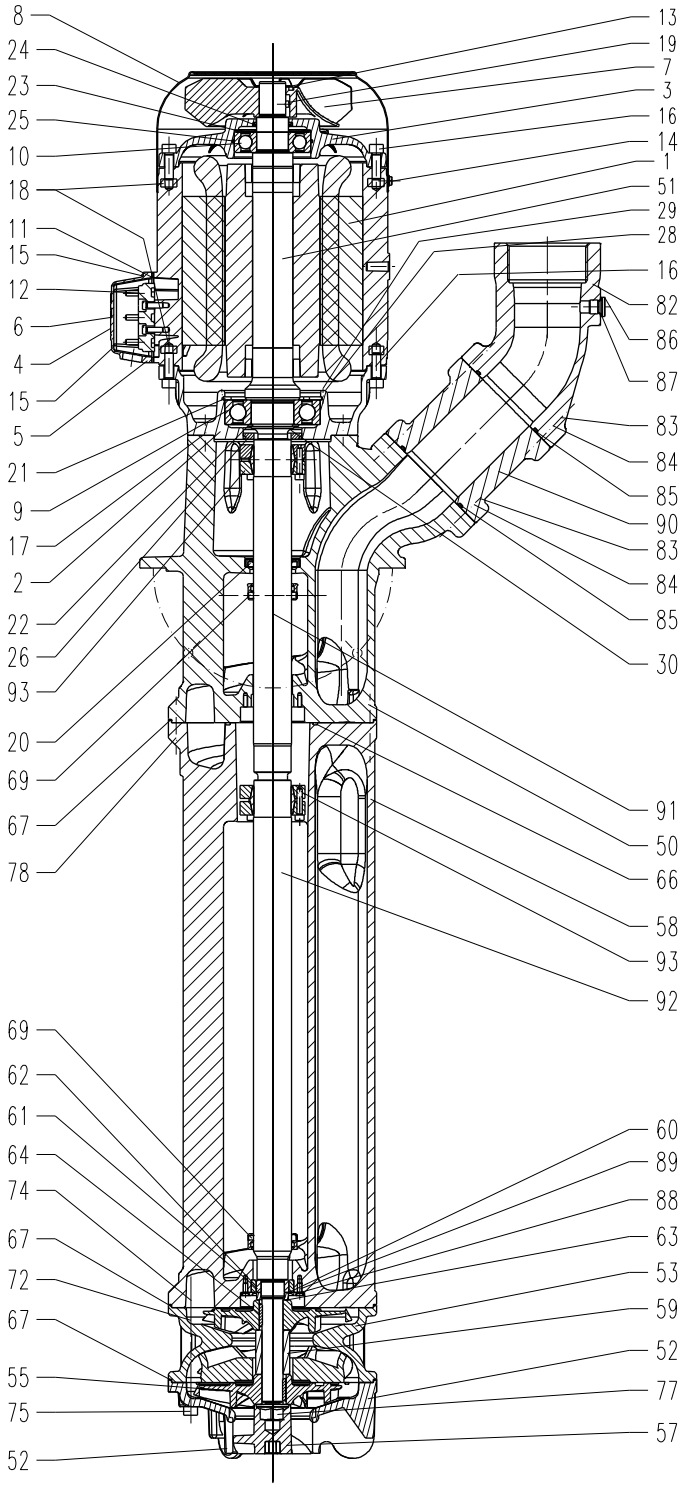
The motor shaft is spinning in permanently greased ball bearings (with special grease and increased bearing play) and does not require any special maintenance.

9 Trouble shooter's guide

Fault	Cause	Remedy
Motor does not start, no motor noise	At least two of the power supply leads have failed Overload has tripped	Check fuses, terminals and supply leads . Inspect overload
Motor does not start, humming noise	One of the supply leads has failed Impeller faulty Motor bearing faulty	See above Replace impeller Replace bearing
Overload trips	Pump locked up mechanically High on/of cycling frequency	Inspect pump hydraulics Check application
Power consumption is too high	Wrong direction of rotation of impeller Lime or other deposits mechanical friction	See above Clean pump mechanism repair pump
Motor overheats	High on/off cycling frequency Wrong power supply (voltage or cycles) Insufficient cooling	See above Power supply must correspond with name plate rating Check air flow at motor fan
Pump does not pump	liquid level too low Pump mechanism faulty Pipe blocked	Fill up liquid replace pump mechanism Clean pipe
Insufficient flow and pressure	Wrong direction of rotation of impeller Pump mechanism silted up Worn pump mechanism	Change over two power supply leads Clean pump mechanism Replace pump mechanism
Incorrect flow or pressure	Wrong power supply (voltage or cycles)	Power supply must correspond with name plate rating
Running noise/Vibration	Foreign objects in pump end Impeller damaged Bearing/Bushing broken	Remove foreign objects Replace impeller Replace bearing/bushing

10 Spare part

10.1 Spare part list for the immersion pumps of the series STA/SAL901 ... 1303



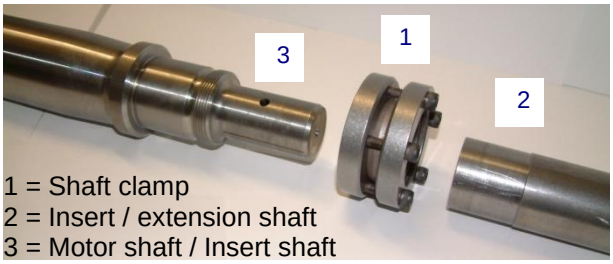
Item	Description	
1	Stator with terminal board	
2	Motor flange	
3	End shield	
4	Terminal box up to 4.0 kW	
5	Terminal box frame up 5.5 kW	
6	Terminal box cover up 5.5 kW	
7	Fan	
8	Fan cover	
9	Ball bearing	DIN 625
9	Ball bearing 1.3…2.6, 7.5 kW	DIN 628
10	Ball bearing	DIN 625
11	Gasket	
12	Gasket up 5.5 kW	
13	Retaining ring	
13	Retaining ring 1.3…2.6 kW	
14	Thread rolling screw	DIN 7500
15	Slotted cheese head screw	DIN 84
16	Socket head cap screw	DIN 912
17	Socket head cap screw	DIN 912
18	Nut up 11 kW	DIN 934
19	Parallel pin	DIN 7
20	Shaft seal	
21	Retaining ring up to 5.5 kW	DIN 472
22	Retaining ring up to 5.5 kW	DIN 471
23	Compensation disk	
24	Shaft seal	
25	O-ring	
26	Shaft seal up 7.5 kW	
28	Bearing cover 7.5 kW and over	
29	Socket head cap screw 7.5 kW	DIN 931
30	Shaft nut 7.5 kW and over	
50	Pump body	
51	Shaft with rotor	
52	Inlet cover for STA	
52	Intake cover for SAL	
53	Pump plate up STA/SAL902, 1002, 1302	
55	Impeller	
57	Suction screw only for SAL	
58	Extension pump body up 750 mm depth of immersion	
59	Distance liner	
60	Distance liner	
61	Running sleeve	
62	Bearing bush	
63	Distance plate	
64	Woodruff key	DIN 6888
66	O-ring up 750 mm depth of immersion	
67	O-ring	
68	Splash ring	
69	Splash ring	
72	Socket head cap screw	DIN 912
74	Stud bolt STA/SAL1302...1303	
75	Hexagon domed cap nut STA/SAL1302...1303	DIN 1587
77	Hexagon thin nut STA	
78	Socket head cap screw up 750 mm depth of immersion	DIN 912
82	Joining socket	
83	Socket head cap screw	DIN 912
84	Spring washer	DIN 7980
85	O-ring	
86	Screw plug	DIN 908
87	Sealing ring	DIN 7603
88	Serrated lock washer	
89	Flat head screw	DIN 7991
90	Adapter up 11 kW	
91	Extension shaft up 750 mm depth of im.	
92	Insert shaft	
93	Shaft clamp 2 x up 750 mm depth of im.	

10.2 Indications to the spare part order

Spare parts are available from the supplier.
Standard commercially available parts are to be purchased in accordance with the model type.
The ordering of spare parts should contain the following details:

1. **Pumptype**
   e.g. STA902 / 370
2. **Pump No.**
   e.g. 08152710
   The date of the construction year is a component of the pumps type number.
3. **Voltage, Frequency and Power**
   Take item 1, 2 and 3 from the nameplate
4. **Spare part with item No.**
   e.g. Intake cover item No. 52

11 Repair Instructions / Replacing shaft clamps and shafts



1 = Shaft clamp
2 = Insert / extension shaft
3 = Motor shaft / Insert shaft

11.1 Dismantling the insert shaft or extension shaft

– Disconnect the submergible pump from the mains both electrically and mechanically.
– Remove pump from system. Secure pump against tipping over, i.e. use ropes to secure pump.
– Set the pump down on the fan cover. Dismantle the pump unit and the extension pump body (if appropriate).

Wear safety gloves!
Risk of injury due to sharp edges on pump components, i.e. impeller blades.

– Loosen the screws on the shaft clamp (1) one after the other.

Do not, under any circumstances, remove the screws completely, **danger of injury!**

– Remove the extension shaft (2) and shaft clamp (1).
– Dismantle the pump body.
– Loosen the screws on the shaft clamp (1) (see above), pull the insert shaft (2) off the motor shaft (3).

11.2 Assembling the insert shaft and motor shaft

ATTENTION

Clean the contact surfaces of the insert shaft (2) (inside) and the motor shaft (3). They must not be lubricated or oiled.

– Set the motor down on the fan cover.
– Position the shaft clamp (1) (use a new shaft clamp) in the centre of the cranked clamping diameter (2) of the insert shaft.
– Insert the motor shaft (3) into the insert shaft (2).
– **Tighten**:
  Mark the first screw and tighten all the screws evenly by hand, one after the other in a clockwise direction (not cross-ways).
– (up to 11 kW)
  Use a torque screwdriver to tighten each screw first with 2 Nm then with 3,5 Nm and finally with 5 Nm (in a clockwise direction again).
– (12 kW and higher)
  Use a torque screwdriver to tighten each screw first with 2 Nm then with 7 Nm and finally with 12 Nm (in a clockwise direction again).
– Mount the pump body.

The remainder of the reassembly process is to be completed in the opposite order of the prior described dismantling process.

ATTENTION

Note torques for the screw connections!

When putting the pump back into use, **make sure the direction of rotation is correct!**

Tightening torques for screwed connections

Thread - ∅	**M5**	**M8**	**M10**	**M16**	**M16**
Strength classes	4.8	8.8	10.0	8.8	
Tightening torque (Nm)	**3** Nm	**20** Nm (**4.5** Nm Item. 3)	**30** Nm Item. 18	**60** Nm Item. 83	**60** Nm Item. 77

12 Disposal

When disposing of the pump or the packaging materials the local and national regulation for proper disposal must be complied with.
Prior to its disposal, the pump must be completely drained and decontaminated if necessary.

13 EC declaration of conformity

DEUTSCH / ENGLISH /FRANÇAIS / ESPAÑOL

BRINKMANN PUMPS

EG-Konformitätserklärung

EC declaration of conformity / Déclaration de conformité CE / Declaración de conformidad CE

Hersteller / Manufacturer / Constructeur / Fabricante

Brinkmann Pumpen, K. H. Brinkmann GmbH & Co. KG
Friedrichstraße 2, D-58791 Werdohl

Produktbezeichnung / Product name / Désignation du produit / Designación del producto

Tauchpumpen / Immersion pumps / Pompes plongeantes / Bombas de inmersión

Typ / Type / Tipo **STA/SAL901…1303**

Das bezeichnete Produkt stimmt mit den folgenden Richtlinien des Rates zur Angleichung der Rechtsvorschriften der EG-Mitgliedsstaaten überein:
The named product conforms to the following Council Directives on approximation of laws of the EEC Member States:
Le produit sus-mentionné est conforme aux Directives du Conseil concernant le rapprochement des législations des Etats membres CEE:
El producto designado cumple con las Directivas del Consejo relativas a la aproximación de las legislaciones de los Estados Miembros de la CEE:

2006/42/EG	Richtlinie für Maschinen
2006/42/EC	Council Directive for machinery
2006/42/CEE	Directive du Conseil pour les machines
2006/42/CEE	Directivas del Consejo para máquinas
2004/108/EG	Richtlinie für elektromagnetische Verträglichkeit
2004/108/EC	Council Directive for Electromagnetic compatibility
2004/108/CEE	Directive du Conseil pour Compatibilité électromagnétique
2004/108/CEE	Directivas del Consejo para Compatibilidad electromagnética

Hinsichtlich der elektrischen Gefahren wurden gemäß Anhang I Nr. 1.5.1 der Maschinenrichtlinie 2006/42/EG die Schutzziele der Niederspannungsrichtlinie 2006/95/EG eingehalten.
With respect to potential electrical hazards as stated in appendix I No. 1.5.1 of the machine guide lines 2006/42/EG all safety protection goals are met according to the low voltage guide lines 2006/95/EG.
Conformément à l'annexe I N° 1.5.1 de la Directive "Machines" (2006/42/CE) les objectifs de sécurité relatifs au matériel électrique de la Directive "Basse Tension" ont été respectés.
Con respecto al potencial peligro eléctrico como se indica en el apéndice I No. 1.5.1 del manual de la máquina 2006/42/EG, todos los medios de protección de seguridad se encuentran según la guía de bajo voltaje 2006/95/EG.

Die Übereinstimmung mit den Vorschriften dieser Richtlinien wird nachgewiesen durch die vollständige Einhaltung folgender Normen:
Conformity with the requirements of this Directives is testified by complete adherence to the following standards:
La conformité aux prescriptions de ces Directives est démontrée par la conformité intégrale avec les normes suivantes:
La conformidad con las prescripciones de estas directivas queda justificada por haber cumplido totalmente las siguientes normas:

Harmonisierte Europ. Normen / Harmonised Europ. Standards / Normes europ. harmonisées / Normas europ. armonizadas

EN 809 :1998+A1 :2009+AC :2010 EN ISO 12100 :2010 EN 60204-1 :2006/AC :2010 EN 61000-3-2 :2006/A2 :2009 EN 61000-3-3 :2013 EN 61000-6-2 :2005/AC :2005 EN 61000-6-3 :2007/A1 :2011/AC :2012

Nationale Normen / National Standards / Normes nationales / Normas nacionales : **EN 60034-1 :2010/AC :2010**

Die Hinweise in der Betriebsanleitung für den Einbau und die Inbetriebnahme der Pumpe sind zu beachten.

The instructions contained in the operating manual for installation and start up the pump have to be followed.

Les indications d'installation / montage et de mise en service de la pompe prévues dans l'instruction d'emploi doivent être suivies.

Tenga en cuenta las instrucciones en el manual para la instalación y puesta en marcha de la bomba.

Brinkmann Pumpen, K. H. Brinkmann GmbH & Co. KG

Werdohl, 26.08.2015

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